

FORM PTO-1390 (Modified)
(REV 11-2000)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371

213920US2XPCT

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR

09/926237

INTERNATIONAL APPLICATION NO.
PCT/EP00/02210INTERNATIONAL FILING DATE
9 March 2000PRIORITY DATE CLAIMED
29 March 1999

TITLE OF INVENTION

LOW NOISE TRANSFORMER

APPLICANT(S) FOR DO/EO/US

CALABRO Stefano et al.

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (24) indicated below.
4. ☒ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
 - a. ☐ is attached hereto (required only if not communicated by the International Bureau).
 - b. ☒ has been communicated by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
 - a. ☒ is attached hereto.
 - b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
 - a. ☐ are attached hereto (required only if not communicated by the International Bureau).
 - b. ☐ have been communicated by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☒ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☐ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
10. ☐ An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).
11. ☐ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☒ A copy of the International Search Report (PCT/ISA/210).

Items 13 to 20 below concern document(s) or information included:

13. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☒ A **FIRST** preliminary amendment.
16. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
17. ☐ A substitute specification.
18. ☐ A change of power of attorney and/or address letter.
19. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.
20. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4).
21. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
22. ☐ Certificate of Mailing by Express Mail
23. ☒ Other items or information:

Request for Consideration of Documents Cited in International Search Report/Notice of Priority
PCT/IB/304/Drawings (3 Sheets)/PCT/IB/308

U.S. APPLICATION NO. (IF KNOWN), SEE 37 CFR

097/926237

INTERNATIONAL APPLICATION NO.

PCT/EP00/02210

ATTORNEY'S DOCKET NUMBER

213920US2XPCT

24. The following fees are submitted:.

BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :

- ☐ Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO **\$1000.00**
- ☒ International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO **\$860.00**
- ☐ International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO **\$710.00**
- ☐ International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) **\$690.00**
- ☐ International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) **\$100.00**

ENTER APPROPRIATE BASIC FEE AMOUNT =

CALCULATIONS PTO USE ONLY

\$860.00

Surcharge of **\$130.00** for furnishing the oath or declaration later than ☐ 20 ☒ 30 months from the earliest claimed priority date (37 CFR 1.492 (e)).

\$130.00

| CLAIMS | NUMBER FILED | NUMBER EXTRA | RATE |
|--------------------|--------------|--------------|-----------|
| Total claims | 11 - 20 = | 0 | x \$18.00 |
| Independent claims | 3 - 3 = | 0 | x \$80.00 |

\$0.00

\$0.00

Multiple Dependent Claims (check if applicable). ☐

\$0.00

TOTAL OF ABOVE CALCULATIONS =

\$990.00

☐ Applicant claims small entity status. (See 37 CFR 1.27). The fees indicated above are reduced by 1/2.

\$0.00

SUBTOTAL =

\$990.00

Processing fee of **\$130.00** for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (f)).

\$0.00

TOTAL NATIONAL FEE =

\$990.00

Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (check if applicable). ☐

\$0.00

TOTAL FEES ENCLOSED =

\$990.00

Amount to be:
refunded \$
charged \$

- a. ☒ A check in the amount of **\$990.00** to cover the above fees is enclosed.
- b. ☐ Please charge my Deposit Account No. _____ in the amount of _____ to cover the above fees. A duplicate copy of this sheet is enclosed.
- c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. **15-0030** A duplicate copy of this sheet is enclosed.
- d. ☐ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. **Credit card information should not be included on this form.** Provide credit card information and authorization on PTO-2038.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:



22850

Surinder Sachar
Registration No. 34,423

SIGNATURE

Marvin J. Spivak

NAME

24,913

REGISTRATION NUMBER

9-28-01

DATE

213920US-2-X PCT

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF :
STEFANO CALABRO ET AL : ATTN: APPLICATION DIVISION
SERIAL NO: NEW U.S. PCT APPLN :
(Based on PCT/EP001/02210)
FILED: HEREWITH :
FOR: LOW NOISE TRANSFORMER :

PRELIMINARY AMENDMENT

ASSISTANT COMMISSIONER FOR PATENTS
WASHINGTON, D.C. 20231

SIR:

Prior to a first examination on the merits, please amend the above-identified application as follows:

IN THE CLAIMS

Please amend the claims as follows:

3. (Amended) An electrical transformer as in claim 1 characterized in that said actuating means comprise one or more piezoelectric stack elements.

4. (Amended) An electrical transformer as in claim 1 characterized in that said actuating means are connected to controlling means placed outside said tank.

IN THE ABSTRACT

Please cancel the original Abstract page 9 in its entirety and insert therefor

ABSTRACT OF THE DISCLOSURE

An electrical transformer including a tank containing transformer fluid, a transformer core and winding subassembly disposed in the transformer fluid within and spaced apart from the tank. An active device, disposed in the transformer fluid within the tank, varies the volume of the transformer fluid in order to reduce pressure waves generated by the vibration of the core and winding subassembly during electromagnetic operation. The active device includes at least a cell having a main body and a corrugated membrane connected to the main body in order to realize a sealed container able to maintain a low pressure atmosphere inside, and an actuator placed inside the sealed container and solidly connected to the corrugated membrane.

REMARKS


Favorable consideration of this application, as presently amended, is respectfully requested.

The present preliminary amendment is submitted to place the above-identified application in more proper format under United States practice. By the present preliminary amendment the claims have been amended to no longer recite any improper multiple dependencies. A new Abstract believed to be in more proper format under United States practice is also submitted herein.

The present application is believed to be in condition for a full and thorough examination on the merits. An early and favorable consideration of the present application is hereby respectfully requested.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



Gregory J. Maier
Attorney of Record
Registration No. 25,599
Surinder Sachar
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Marked-Up Copy
Serial No: New Appl.

Amendment Filed on:

9-28-01

IN THE CLAIMS

--3. (Amended) An electrical transformer as in claim 1 [or 2] characterised in that said actuating means comprise one or more piezoelectric stack elements.

4. (Amended) An electrical transformer as in [one or more of the previous] claim[s] 1 characterised in that said actuating means are connected to controlling means placed outside said tank.--

IN THE ABSTRACT

(New).

LOW NOISE TRANSFORMER

DESCRIPTION

The present invention generally relates to electrical transformers and more particularly to electrical transformers equipped with means having particular structure and geometry for obtaining low noise levels.

It is well known that electrical transformers generally comprise a tank containing a transformer fluid (i.e. mineral oil), a transformer core and a winding subassembly. The transformer core and winding subassembly are generally placed in the transformer fluid and are spaced apart from the tank of the transformer.

It is also well known that noise from transformers is a problem for utility industries or companies, especially when the transformer is installed in urban areas.

The people skilled in the art know that noise in transformers is generated by vibration of the core and winding subassembly during electromagnetic operation and by cooling ventilators used for extracting heat, generated during electromagnetic operation, from the tank to the surrounding atmosphere. While noise from cooling ventilators can be effectively reduced by designing lower speed and larger diameter ventilators equipped with low noise blades, the reduction of the noise from the core and winding subassembly vibration is still a problem, given the fact that solutions known in the state of the art are affected by several drawbacks.

Most of the conventional approaches of the state of the art are oriented to consider passive solutions, for reducing the core noise.

A known approach is to add mass to the transformer core in order to avoid core vibration. Unfortunately, this approach leads to transformers having quite larger core sectional area, with significant increase of weight and costs.

Other approaches consider the use of passive devices inside the transformer tank. These devices are constituted by stacks of layers that are made of materials

having elastic properties (i.e rubber). Being placed inside the transformer tank, they act as damping elements adsorbing transformer fluid pressure waves generated by the core and winding subassembly vibration. The main drawback of this approach is due to the fact that these devices can be designed only for adsorbing fluid pressure waves having a certain amplitude and frequency. If a variation of the frequency and the amplitude of such pressure waves occurs, for example due to changed operational conditions of the transformer, the damping action of these devices may not be effective.

The use of active devices for noise reduction is disclosed, for example, in the US patent N° 5,726,617.

In the mentioned patent, the use of dynamic-pressure varying devices, placed inside the transformer tank, is considered. Said means, constituted for example by hydraulic actuators or pumps or other similar devices, vary dynamically the pressure of the transformer fluid in order to reduce the pressure waves generated by the operating core and winding subassembly. An active damping device, placed between the transformer tank and the transformer core and winding subassembly is also disclosed. Its function is to damp actively the vibrations of the core and winding subassembly. Vibration sensors and a controller of the mentioned active devices are placed inside or outside the tank.

The solution described in the mentioned patent, appears, however, of difficult implementation, given the fact that no particular attention is provided to the structure of the mentioned active devices. Actually, a significant amount of energy is required for actuating hydraulic actuators or pumps or similar devices. Moreover due to the not negligible size of such devices, only a small number of them can be placed inside the tank. This fact implies a noise cancellation, which is certainly not optimal, being dependent on the particular position of the dynamic-pressure varying devices. In addition, complicated assembling operations are evidently required for mounting said hydraulic actuators and/or similar devices. Complicated assembling operations are also required for

mounting said damping devices placed between the core and the tank of the transformer. This fact further increases the manufacturing costs.

It is an object of the present invention to provide an electrical transformer able to overcome the above mentioned problems, in particular without having any significant increase of costs for manufacturing or assembling devices able to cancel the noise from core and winding subassembly.

A further object of the present invention is to provide an electrical transformer which uses, for reducing the noise generated by the core and winding subassembly, a plurality of active devices that are able to vary the transformer fluid volume inside the transformer tank and are very simple to be placed inside the inner surface of the tank.

An other object of the present invention is to provide an electrical transformer comprising a plurality of active devices, which can be easily controlled depending on the operating conditions of the transformer.

In order to achieve these objects and others that will become apparent hereinafter, it is provided an electrical transformer, according to the present invention, which comprises:

- a tank containing transformer fluid;
- a transformer core and winding subassembly disposed in said transformer fluid within and spaced apart from said tank;
- active means for varying the volume of said transformer fluid in order to reduce pressure waves generated by the vibration of said core and winding subassembly during electromagnetic operation, said active means being disposed in said transformer fluid within said tank.

The transformer, according to the present invention, is characterised in that said active means comprise at least a cell having:

- a main body and a corrugated membrane operatively connected to said main body in order to realise a sealed container able to maintain a low pressure atmosphere inside;

- actuating means placed inside said sealed container and solidly connected to said corrugated membrane.

The present invention will now be described in more detail with reference to a number of embodiments in accordance to the invention which are given by way of example and which are shown in the accompanying drawings in which:

figure 1 is a schematic view of an embodiment of an electrical transformer according to the present invention;

figure 2 is a sectional view of an embodiment of an active cell comprised in an electrical transformer according to the present invention;

figure 3 is an upper view of an embodiment of an active cell comprised in an electrical transformer according to the present invention.

Referring to figure 1, a schematic view of an embodiment of an electrical transformer according to the present invention is represented.

The transformer according to the present invention comprises a tank 1 containing transformer fluid 2, such as mineral oil. A transformer core and winding subassembly, schematically represented by the reference number 3, are disposed in said transformer fluid, within and spaced apart from said tank;

As schematically represented in figure 1, pressure waves 4 are generated by the vibration of the core and winding subassembly 2 during electromagnetic operation of the transformer. Active means comprising at least a cell 5 are provided for regulating the volume of the transformer fluid 2 in order to reduce pressure waves 4.

Referring to figures 2 and 3, two different schematic views of a possible structure of a cell 5 are presented.

A cell 5 is structured as a main body 20 having a corrugated membrane 21 operatively connected so as to realise a sealed container. The shape and the number of corrugations for the membrane 21 can be easily designed, according to the needs, by the skilled artisan. Preferably, the main body 20 and the membrane 21 are made of stainless steel and can be welded at the edges.

In an alternative embodiment, every cell 5 can be provided with elastic means 23, preferably a soft spring, operatively connected between the main body 20 and the corrugated membrane 21, preferably on the central area 22 of the cell 5. Elastic means 23 have the function of keeping the central area 22 parallel to the plane of the main body 20.

Actuating means 24 are provided inside the cell 5. They are solidly connected to the corrugated membrane 21 and preferably placed close to the central area 22. In a preferred embodiment, illustrated in figures 2 and 3, actuating means 24 are realised with a plurality of piezoelectric stack elements 25. Advantageously, a cell 5 is also equipped with a valve 26, necessary for forcing internally a low pressure atmosphere 28 (an indicative value can be 0.1 bar) and with an electrical connection 27, necessary for providing driving signals to the actuating means 24.

Low pressure atmosphere causes the partial quenching of the corrugated membrane 21 onto the main body 20. The complete quench of the membrane 21 is prevented by the presence of the actuating means 24. Advantageously a plurality of cells 5 can be placed inside the tank 1 and connected to controlling means 6 placed outside the tank 1. The layout of the active cells inside the tank can be easily chosen and optimised by the skilled artisan in order to obtain the most effective cancellation of the pressure waves 4. Detection means 7 for detecting pressure waves 4 are also provided. They comprise (figure 1) one or more transducers that can be, for example, pressure transducers 8 placed inside the tank or, alternatively, vibration transducers 9, placed outside the tank 1, for detecting the vibrations of the tank 1 generated by the pressure waves 4. The detection means 7 are connected to the controlling means 6. The connection can preferably be of the electrical type, but the meaning of the term "connection" should be intended extensively. So other kinds of connections, such as wireless connections (such as for example through radio communication) or cabled connections (such as for example through optical cables) can be provided.

In a preferred embodiment, controlling means 6 comprise a feedback controller, such as a programmed digital computer.

Referring now to all the mentioned figures, the operation of reducing transformer noise is described.

Pressure waves 4 are detected by detection means 7 which transmit input signals 100, indicative of the amplitude and frequency of such pressure waves 4, to the controlling means 6.

Using appropriate software programs, the controlling means 6 analyse the input signals 100 and, correspondingly transmit output signals 101 for driving the actuating means 24 comprised in each cell 5.

Also the connection between the controlling means 6 and the actuating means 24 should be intended in an extensive way, as described above.

Actuating means 24 actuate the corrugate membrane 21 forcing its vibration which generates pressure waves, indicated by reference number 40 in figure 1, able to change the volume of the transformer fluid. Such fluid volume changes, proportional to the amplitude and frequency of pressure waves 4, are very effective in core and winding subassembly noise reducing.

If operating conditions of the transformer change, also the vibration mode of the membrane 21 changes accordingly, thanks to the action of the controlling means 6 which always operate for minimising the magnitude of the pressure waves 4.

As mentioned, a plurality of cells can be placed inside the transformer tank 1, considering the most appropriate layout. In a preferred embodiment of the present invention, different groups of cells, corresponding to different locations of the tank, can be driven independently. In practice, each group of cells can be driven in closed relation to the amplitude and frequency of the pressure waves that are affecting the tank area where the group is located, at a certain instant. This functioning mode improves very effectively the transformer noise cancellation.

The present invention has proven to be of relatively easy and low cost realisation. Actually, every cell 5 is characterised by a structure very simple to manufacture and having very low size. Due to the use of piezoelectric elements, as actuating means 24, every cell has proven to be of easy control either singularly or in parallel with other cells. This fact implies that a relatively large number of cells can be used. The use of a large amount of cells is also favoured by the relatively low voltage signals that can be used for driving the actuating means 24 of each cells 5.

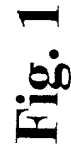
The foregoing description of preferred embodiments of the present invention has been presented for purposes of illustration. It is not intended to be exhaustive or to limit the invention to the precise form disclosed and obviously many modifications and variations are possible in light of the above teaching.

In practice many variations may suggest themselves to those skilled in the art within the scope of the invention disclosed herein.

CLAIMS

1. An electrical transformer comprising:
- 5 -a tank (1) containing transformer fluid (2);
- a transformer core and winding subassembly (3) disposed in said transformer fluid (2) within and spaced apart from said tank (2);
- active means for varying the volume of said transformer fluid (2) in order to reduce pressure waves (4) generated by the vibration of said core and winding subassembly (3) during electromagnetic operation, said active means being
- 10 disposed in said transformer fluid (2) within said tank (1);
- characterised in that said active means comprise at least a cell (5) having:
- a main body (20) and a corrugated membrane (21) operatively connected to said main body (20) in order to realise a sealed container able to maintain a low
- 15 pressure atmosphere (28) inside;
- actuating means (24) placed inside said sealed container and solidly connected to said corrugated membrane (21).
2. An electrical transformer as in claim 1 characterised in that it comprises elastic means (23) placed inside said cell (5), operatively connecting said corrugated
- 20 membrane (21) and said main body (20).
3. An electrical transformer as in claim 1 or 2 characterised in that said actuating means (24) comprise one or more piezoelectric stack elements (25).
4. An electrical transformer as in one or more of the previous claims characterised in that said actuating means (24) are connected to controlling means (6) placed
- 25 outside said tank (1).
5. An electrical transformer as in claim 4 characterised in that said controlling means (6) are connected to detection means (7) for detecting pressure waves (4) generated by the vibration of said core and winding subassembly during electromagnetic operation and transmitting a signal (100) indicative of the
- 30 amplitude and frequency of said pressure waves (4) to said controlling means (6).
6. An electrical transformer as in claim 5 characterised in that said detection means (7) are placed inside the tank (1) of said transformer.

7. An electrical transformer as in claim 5 characterised in that said detection means (7) are placed outside the tank (1) of said transformer.
8. An electrical transformer as in claims 7 characterised in that said detection means (7) comprise one or more transducers (9) for detecting the vibrations of said tank (1) generated by said pressure waves (4).
9. An electrical transformer as in claim 6 characterised in that said detection means (7) comprise one or more pressure transducers (8).
10. Method for reducing pressure waves generated by the vibration of said core and winding subassembly (3) during electromagnetic operation of an electrical transformer as in one or more of the previous claims, characterised in that it comprises the following steps:
- detecting pressure waves (4) generated by the vibration of said core and winding subassembly (3) of said electrical transformer during electromagnetic operation;
 - transmitting signals (100), indicative of amplitude and frequency of said pressure waves (4), to said controlling means (6);
 - analysing the signal (100) transmitted by said detection means (7) and transmitting signals (101) for driving said actuating means (24) comprised in each of said cells (5);
 - generating, through the vibration of the corrugated membrane (21) of each of said cells, transformer fluid pressure waves (40), varying in amplitude and frequency, able to regulate the volume of said transformer fluid (2).
11. An active device (5), for regulating the volume of a fluid (2) in which said device (5) is disposed, through the generation of fluid pressure waves (40) varying in amplitude and frequency, characterised in that it comprises:
- a main body (20) and a corrugated membrane (21) operatively connected to said main body (20) in order to realise a sealed container able to maintain a low pressure atmosphere (28) inside;
 - actuating means (24) placed inside said sealed container and solidly connected to said corrugated membrane (21).



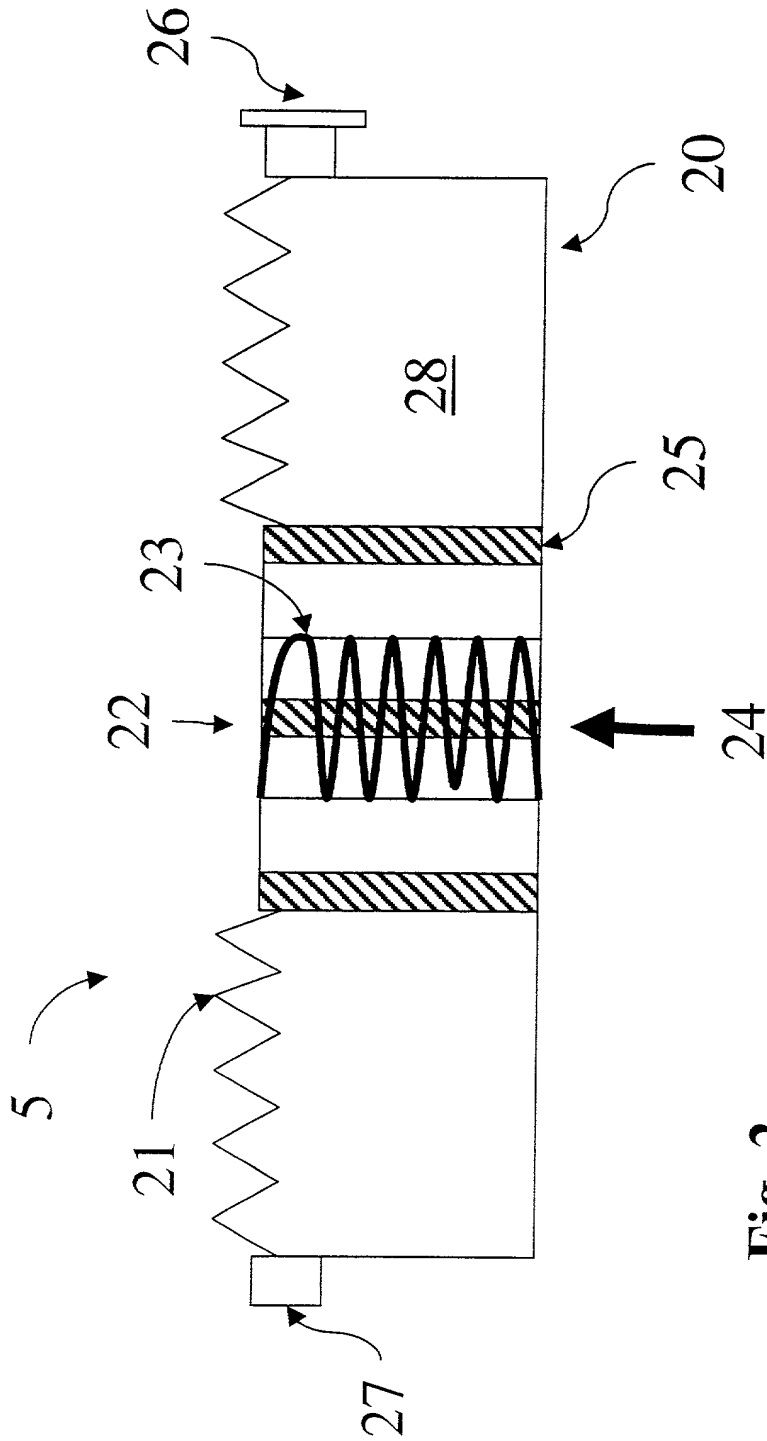


Fig. 2

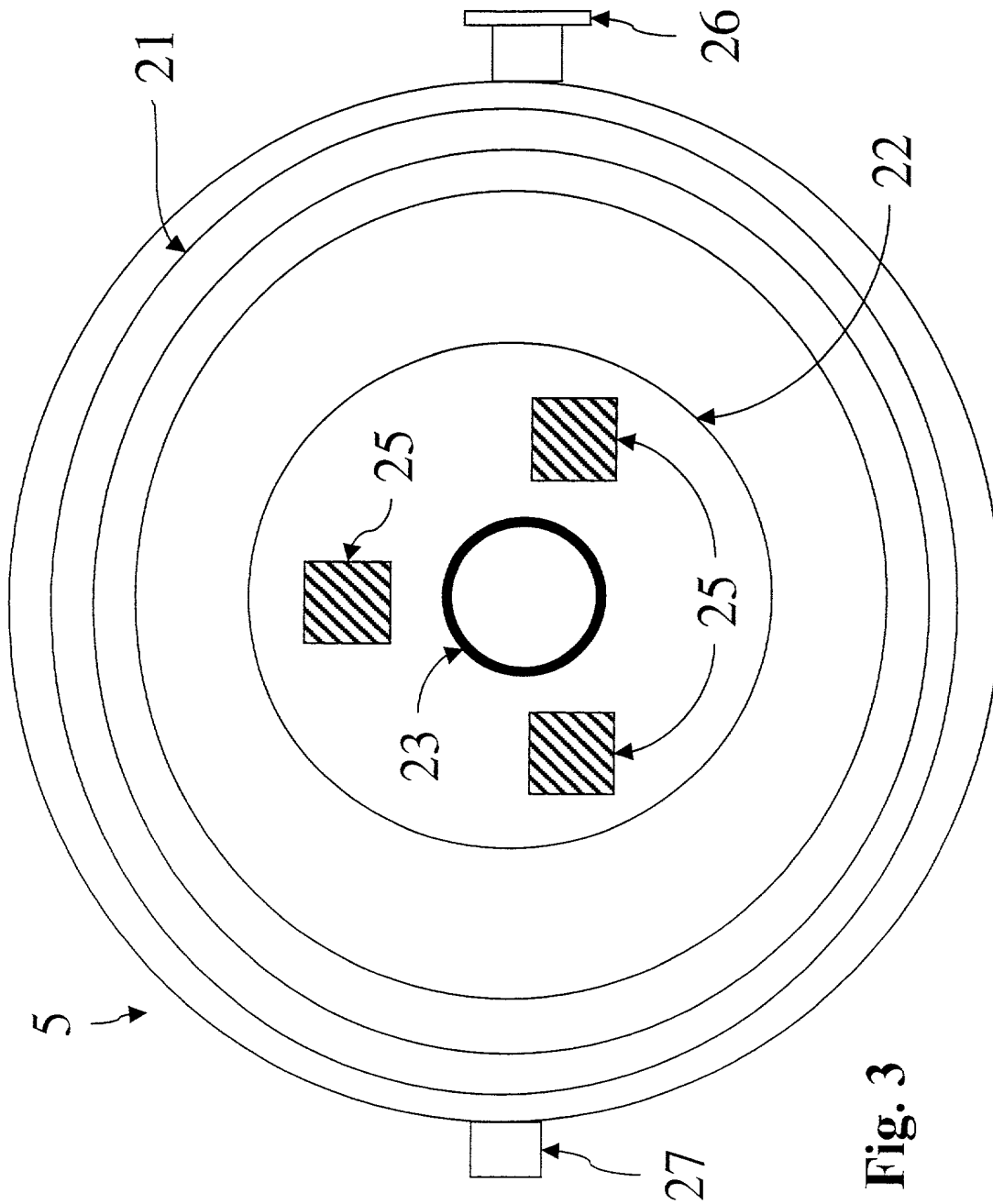


Fig. 3

Declaration, Power Of Attorney and Petition

Page 1 of 3

WE (I) the undersigned inventor(s), hereby declare(s) that:

My residence, post office address and citizenship are as stated below next to my name,

We (I) believe that we are (I am) the original, first, and joint (sole) inventor(s) of the subject matter which is claimed and for which a patent is sought on the invention entitled

LOW NOISE TRANSFORMER

the specification of which

☐ is attached hereto.

☐ was filed on _____ as

Application Serial No. _____

and amended on _____.

☒ was filed as PCT international application

Number PCT/EP00/02210

on 09 March 2000,

and was amended under PCT Article 19

on _____ (if applicable).

We (I) hereby state that we (I) have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

We (I) acknowledge the duty to disclose information known to be material to the patentability of this application as defined in Section 1.56 of Title 37 Code of Federal Regulations.

We (I) hereby claim foreign priority benefits under 35 U.S.C. § 119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed. Prior Foreign Application(s)

| Application No. | Country | Day/Month/Year | Priority Claimed |
|-------------------|---------------|----------------------|---|
| <u>99200953.0</u> | <u>EUROPE</u> | <u>29 March 1999</u> | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| _____ | _____ | _____ | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| _____ | _____ | _____ | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| _____ | _____ | _____ | <input type="checkbox"/> Yes <input type="checkbox"/> No |

200
MORICONI Franco
NAME OF SECOND JOINT INVENTOR

Franco Moriconi
Signature of Inventor

28.09.2001
Date

NAME OF THIRD JOINT INVENTOR

Signature of Inventor

Date

NAME OF FOURTH JOINT INVENTOR

Signature of Inventor

Date

NAME OF FIFTH JOINT INVENTOR

Signature of Inventor

Date

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TTX

Citizen of: ITALY

Post Office Address: same as above

Residence: _____

Citizen of: _____

Post Office Address: _____

Residence: _____

Citizen of: _____

Post Office Address: _____

Residence: _____

Citizen of: _____

Post Office Address: _____

We (I) hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States provisional application(s) listed below.

| | |
|----------------------|---------------|
| _____ | _____ |
| (Application Number) | (Filing Date) |
| _____ | _____ |
| (Application Number) | (Filing Date) |

We (I) hereby claim the benefit under 35 U.S.C. § 120 of any United States application(s), or under § 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International in the manner provided by the first paragraph of 35 U.S.C. § 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

| Application Serial No. | Filing Date | Status (pending, patented, abandoned) |
|------------------------|----------------------|---------------------------------------|
| <u>PCT/EP00/02210</u> | <u>09 March 2000</u> | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |

And we (I) hereby appoint the following registered practitioner(s):



022850

as our (my) attorneys, with full powers of substitution and revocation, to prosecute this application and to transact all business in the Patent Office connected therewith; and we (I) hereby request that all correspondence regarding this application be sent to



022850

We (I) declare that all statements made herein of our (my) own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

100
CALABRO' Stefano
NAME OF FIRST SOLE INVENTOR

Stefano
Signature of Inventor

28.09.2001
Date

Residence: Largo Zecca, 10/9

I 16124 Genova - ITALY

ITK

Citizen of: ITALY

Mailing Address: same as above